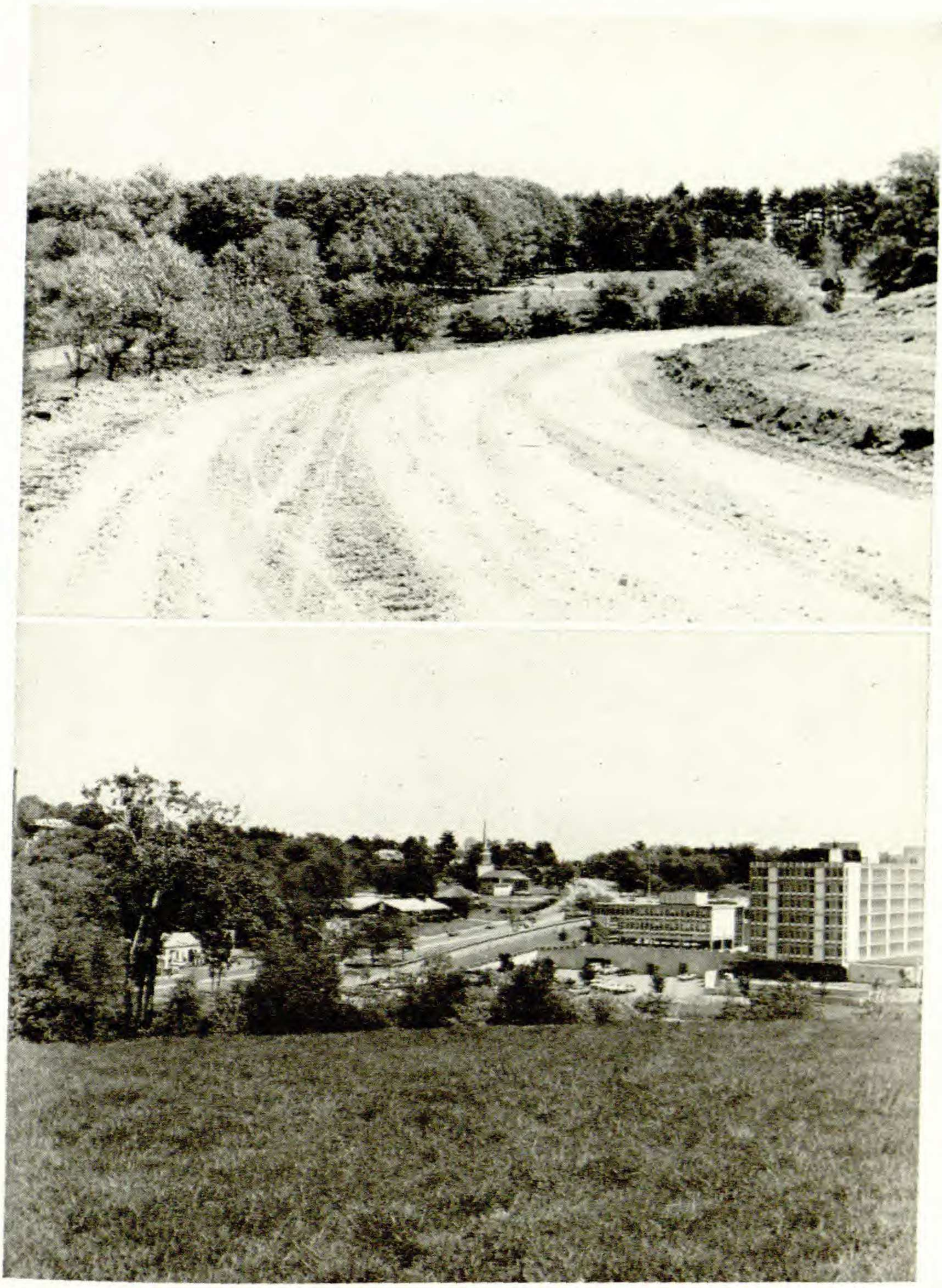


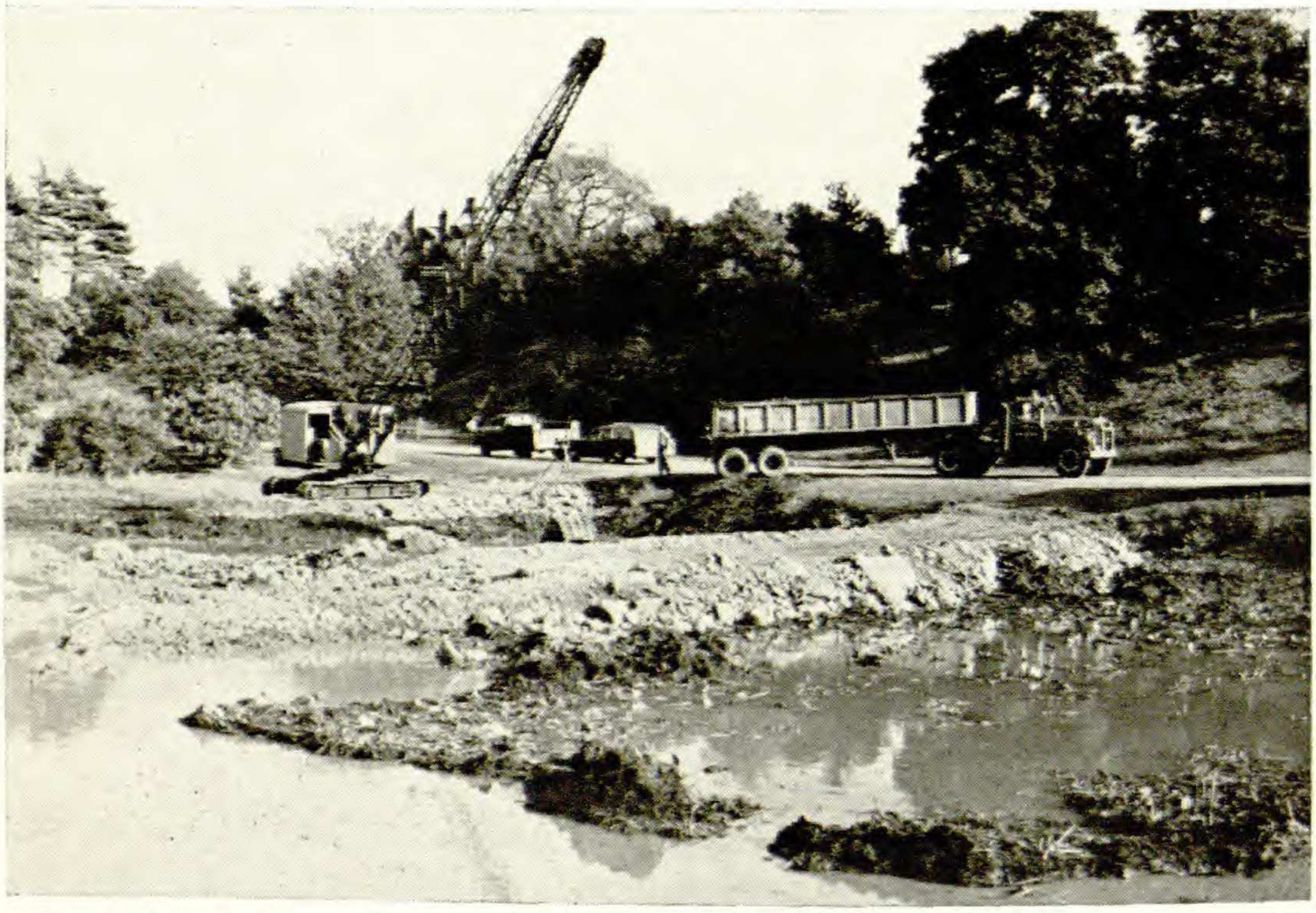
ABOVE: Development of the Weld-Walter Street tract of the Arnold Arboretum began with the cutting of a roadway.

BELOW: View from the summit of the hill showing Route 1 and the Hebrew Rehabilitation Center Buildings.

movement, has established 1,840 feet of roadway 24 feet wide which sweeps gracefully from Walter Street to the highest point, where a turn-around will be developed. The road will be surfaced with a compacting gravel and an oil seal for the present. The land was treated with lime and fertilizer in the fall, following recommendations of the Soil Conservation Service of the U.S. Department of Agriculture. Planting of species which will tolerate the dry hillside conditions will be gradual, and the area will be opened to the public in 1972.

To improve the appearance of the largest of the three ponds along the meadow road, which had become filled with aquatic weeds during recent years, it was dredged. Late fall rains and winter snow filled it, and a program of planting around the pond has begun.

Income available from the Isabella P. Shaw fund helped provide six tons of fertilizer for application to the collection of azaleas and rhododendrons in 1968 and permitted rapid replacement of storm-damaged plants of mountain laurel along the base of Hemlock Hill.



Pond along the meadow road within the Arboretum which was excavated during the summer of 1968.

The growth control chemical Casoron is proving helpful in restricting grass and weeds near special plantings. Its use has reduced mowing time required to maintain the appearance of the grounds and has nearly eliminated the problem of injury to the base of tree trunks, caused by the use of mowing machines.

The genetic dwarf conifer collection established in terraced plantings near the greenhouses in Jamaica Plain has done well in that location where it attracts much popular interest and where it has survived the winter without special protection. Limited to specimens of known origin

and unquestioned identification, this collection has great reference value. A gift of 21 previously unrepresented taxa from Mr. Joel Spingarn, of Baldwin, New York, and collections of native plants from locations along the coast of Maine, made by Mr. Fordham, have increased the variety of the dwarf conifer collection.

Mrs. Ara R. Derderian has accepted responsibility for curating the Larz Anderson collection of *bonsai,* a famous and popular display which has needed competent care for several years. With the help of members of the staff she has carefully pruned and repotted most of the plants during the winter months. Many of the specimens are thought to be imperial *bonsai* because of their age and special character.

For the protection of lawns, nursery area, and roads, special steel edging is being used in the vicinity of the Dana Greenhouses, and, for more efficient work procedures, steel storage bins, shelving, and work benches have been installed in the greenhouse. A new well provided continuous water pressure and flow for irrigation in the nursery area during the dry summer months. The emergency electric generator worked well during electric power failures resulting from the February and March snow storms. Without it the oil-fueled furnaces would have been inoperative and the greenhouse plantings might not have survived two periods of more than six hours without heat.

During the year a total of 672 specimens were planted on the grounds as replacements or additions. Cuttings or grafts have been prepared for 287 taxa which may need replacement. A total of 152 additional taxa have been prepared for distribution to Cooperating Nurserymen, to other arboreta, or to the Friends of the Arnold Arboretum for testing. Staff research required propagation of 78 taxa.

During the year 11 recent staff introductions were distributed to botanical gardens and Cooperating Nurserymen. In addition, 169 shipments of plant materials representing 918 species and varieties were made to gardens and individuals in the United States and 14 other countries. Thirty-seven lots of seeds, including 182 taxa, were sent in response to specific requests from correspondents in the United States and 24 other countries. The 88 shipments of plant materials received during the year included 287 taxa, and 72 lots of seeds represented 182 taxa. Plants not needed by the Arboretum were offered to the Department of Buildings and Grounds of Harvard University and to other colleges and universities, as well as to botanic gardens.

Dr. Wyman cooperated with representatives of the U.S. Bureau of Public Roads and several Roadside Development engineers of the Massachusetts Department of Highways, Bureau of Public Works, in advising and by supplying some plant materials for programs of highway beautification. The Massachusetts Department of Highways also accepted four truck-loads of trees and shrubs for demonstration plantings along the new Blue Star Memorial Highway in eastern Massachusetts.

A collection of 36 plants was donated to Channel 2, Boston's educational television station, for "sale" at its benefit auction in early June.

As the application of electronic data-processing equipment and techniques to collection records has become of great national and international concern, our staff has collaborated with others on projects under way at other institutions. Several types of projects are in a trial period but may be able to incorporate data from our collections in the future. Dr. Howard serves as chairman of the Plant Records Center of the American Horticultural Society. The Plant Records Center, operating under a grant from the Longwood Foundation, has been devising a method for placing the records of the living and herbarium collections of the Longwood Gardens in a retrieval system. The goal of the Plant Records Center is to establish a central data bank of sources of plant materials by recording, eventually, the accession records of all botanical gardens and arboreta in the country. The Arnold Arboretum has the largest collection of woody plants and probably the best records on the origin and behavior of plant species under cultivation, and its records should be a valuable addition to those of the Plant Records Center. Other projects involving electronic data-processing systems are mentioned under the section on the herbarium.

Case Estates:

The Case Estates in Weston, Massachusetts, are the location for the nursery area for the Arnold Arboretum, as well as for special display plantings, demonstration plots for comparison of mulching materials and pruning techniques, ground covers, street trees, and perennial beds; areas of natural woodland, and various materials which cannot be accommodated in Jamaica Plain.

Additions were made to the already established wild flower garden this year and a small collection of rock garden plants was established for trial and demonstration.

The diversity and educational nature of the plantings has made the Case Estates increasingly popular with school classes, colleges, and garden clubs. All of the Weston Schools sent classes for talks or tours during the year, while guided tours were held at the request of many groups from Massachusetts and other states. To facilitate special lectures and the regular popular classes for adults of the surrounding suburban communities, one of the buildings was redesigned as a class room and was equipped with carpeting, shades for darkening the room (for showing slides), and new chairs. The building occupied by the superintendent of the grounds was also reconditioned.

After a severe ice storm in January, a special study session was offered for the Friends of the Arnold Arboretum. Forty-four people spent a cold, sunny day observing the damage and discussing methods of repair and later care for the injured plants. Afterward the trees were pruned by the staff, or where necessary, removed.

Dr. Wyman was requested to aid the town of Weston in planning a small park at the junction of Newton Street and South Avenue, for

which the Arboretum donated plants. The town expressed its deep appreciation in a vote of thanks. The Arboretum also made a gift of fiery red crabapple trees of the cultivar BARBARA ANN for planting near the new fire station.

Herbarium:

The herbarium collections of the Arnold Arboretum are divided in two parts. The portion housed in Jamaica Plain is composed of cultivated plants and serves as a reference collection for the identification of and distribution studies on plants in cultivation. It now comprises over 136,000 specimens and has particularly representative collections of woody ornamental trees and shrubs, especially those which form the large part of our living collections. As a result of the special effort devoted to increasing representation in the cultivated herbarium, additions of some size came this year from Massachusetts, Pennsylvania, Florida, Puerto Rico, Mexico, Venezuela, Brazil, and South Africa.

A new collection of historical interest to us consists of herbarium specimens prepared by F. L. Olmsted who worked with Charles Sargent in planning the Arboretum plantings and who was responsible for the development of the park system in Boston and of Central Park in New York. Given by the Olmsted Associates, this unmounted collection will require much work before it is fully available. It includes specimens collected in the Arnold Arboretum in 1875, the oldest material from our collections and probably some of the first specimens taken from early Arboretum introductions, as well as material of the same period from Central Park.

The major portion of the Arboretum herbarium, housed together with that of the Gray Herbarium in the Harvard University Herbaria in Cambridge, is composed of native plants of the floras of the world. It is most representative for woody plants of the United States and temperate and tropical areas of eastern Asia. The herbarium collection is the basis for monographic and floristic studies, work in plant anatomy, morphology, and palynology, and is used for general identifications or to answer special questions.

The several research projects of the staff center on a number of geographic areas. Dr. Wood and his associates continue their studies toward a *Generic Flora of the Southeastern United States*, which actually has implications affecting a much larger area of the country. During the year Dr. Wood treated the families Betulaceae and Aristolochiaceae for this project; Dr. Vuilleumier worked on some tribes of the Compositae; Dr. Bogle, on the families of the Centrospermae; Dr. Long and Sister Victoria Hayden, as Mercer Fellows, studied the Acanthaceae and Rubiaceae, respectively; Dr. Sorensen is studying the Phytolaccaceae, and Dr. David Bates, of Cornell University, has agreed to continue the work on the Malvaceae started by the late Dr. Brizicky. Other areas in the United States were involved in Dr. Schubert's work on species of the genus *Desmodium* for the *Manual of the Flora of Texas* and Dr. Howard's descrip-

Students and staff of the 1968 Tropical Botany Seminar held at the Fairchild Tropical Garden and the University of Miami. Dr. Howard was one of the instructors.

tive treatment of the plants of the Isles of Shoals (near New Hampshire and Maine).

Dr. Nevling is conducting a cooperative program with scientists of the Universidad Nacional Autónoma de México on the environments and plant resources of the state of Veracruz. The native plants of the region are being studied by him and his associates, or by specialists on particular groups, with emphasis on the ecology and biology of the vegetation, in addition to purely floristic studies. Special data handling techniques are being employed in certain aspects of this project. Plants cultivated in the area are also being studied and will serve as a valuable addition to the cultivated collections at Jamaica Plain. The Arboretum has helped to support, in part, two collectors in Veracruz, Marino Rosas R. and Guadeloupe Martínez Calderón.

Dr. Schubert has special research interest in some species of the genus *Dioscorea* in Mexico which have very small stature but occur in various sections of the genus, not being related by their characteristic habit. She is also concerned with studies of species of *Desmodium* occurring throughout the Americas. Dr. Sorensen has a particular interest in the genus *Dahlia*, the national flower of Mexico, and his studies in that country have increased his understanding of the distribution and growth patterns of the group.

The Caribbean islands are the floristic area of intensive research by Dr. Howard and Miss Powell. Attention has been focused most recently on biological studies of elfin forests in Puerto Rico and St. Kitts. Large

general collections have been studied by them from the Bahamas, Puerto Rico, Guadeloupe, Martinique, and St. Lucia.

Dr. DeWolf is preparing studies of the family Moraceae or of the genus *Ficus* for the floras of Surinam and Venezuela being published in those countries. Other staff work on South America includes that on *Begonia* in Colombia by Dr. Schubert and that on *Schoenobiblus*, of the Thymelaeaceae, by Dr. Nevling, who is also preparing a treatment of the entire family for the flora of Venezuela.

African members of the Moraceae and the genus *Ficus* are being studied by Dr. DeWolf for Uganda and for the Flora of East Tropical Africa; and African *Desmodium* is being treated by Dr. Schubert for the latter flora also.

Several of our botanists are working on aspects of the flora of Asia, which has for a long time been of much interest to the staff of the Arboretum. Dr. Hu has spent most of the past year in Hong Kong. Dr. Perry is working with our collections from Papua and New Guinea, concentrating on the family Myrtaceae. Dr. Hartley has completed the work of identifying his general collections from New Guinea, of which the duplicate series are being prepared for distribution. His special research concerns the family Rutaceae in tropical Asia and his monograph of the genus *Flindersia* is completed. Dr. S. Kazmi, a Mercer Fellow from Pakistan, is undertaking a revision of the family Boraginaceae from West Pakistan and Kashmir.

The largest herbarium project during the year was the rehousing of the fruit and seed collection. This move was necessitated by the appointment of a senior member to the Gray Herbarium staff. The collection is again available for consultation in the Cambridge building. The use of self-sealing polyethylene bags for fruit storage is in the experimental stage and, hopefully, this technique will permit significant growth without requiring additional floor space.

The importance of the herbarium as a scientific tool cannot be underestimated. The scientific needs which use of the herbarium fulfills have been partly demonstrated already. Each year, however, because of new techniques or new methods in which old techniques are employed, along with the growth of the collection, the demands on it become greater and its overall usefulness is extended. In addition to its use by the resident staff, many parts of the collection are studied by scholars from other institutions, usually through a system of inter-institutional loans. During the year just ended loans to other institutions continued at a very high level: 154 loans to 23 foreign and 39 domestic institutions, the total of specimens loaned being 19,351. On the other side of the ledger, 12,300 specimens (110 loans from 31 foreign and 27 domestic institutions) were borrowed for study by our staff.

Added to the herbarium this year were 26,985 sheets, increasing the collection to 908,925 sheets. Of the total collection 136,556 are deposited in the herbarium of cultivated plants in Jamaica Plain, the remainder in the collection in Cambridge. While herbarium growth is at a satisfactory

level, the problem of adequate space to house the collection properly increases proportionately. Several areas are seriously overcrowded and some emergency measures have already had to be taken. We hope for adequate expansion space before the need becomes desperate.

The Department of Botany of the Smithsonian Institution is recording data on type collections in its herbarium. Test cards on a few selected genera have been sent to other herbaria and data from our herbarium have been supplied for this project. Through cooperation we learn the kind of information required, the time and effort needed to record it, the methods of recovery, and most important, we gain further knowledge on the accessibility of information in our own collections.

The cooperative project with the Universidad Nacional Autónoma de México is utilizing the computer facilities of that university to store and process the data acquired under the project entitled "Environments and Plant Resources of Veracruz." At present, data processing techniques are used in the preparation of herbarium labels and for the storage and recovery of the label data. Bibliographic materials for Veracruz are also being processed for retrieval by automatic means.

Library:

The use and the size of our important botanical library continued to increase during the year, necessitating some thought about the amount and kind of space needed to house the collections in the near future. Total accessions this year were nearly double the number indicated in recent reports. While the number of books purchased was up 40 percent, binding of periodicals showed a 150 percent increase. The acquisition of 859 bound volumes brought the total to 55,126, and 138 pamphlets were added to the collection, which now numbers 21,236. The growth of the library may be realized from the new total of 76,362 catalogued items.

Four reels of microfilm and 2141 microfiche cards from various herbaria were purchased jointly with the Gray Herbarium, to keep current these important tools of botanical research. A total of 9175 microfiches are now available for study.

Regular issues of the *Gray Herbarium Index of American Plants*, the *Index Nominum Genericorum*, and the *Torrey Index of Botanical Literature* were incorporated to maintain the regular sequences.

We were pleased to receive a large number of single volume gifts during the year, in addition to a special gift of volumes from the Olmsted Associates of Boston. The library of the late Harold H. Knowlton was also presented to the Arnold Arboretum. A bookplate was prepared with the Knowlton family seal and the inscription "From the library of Harold W. Knowlton, presented in loving memory by his family to the Arnold Arboretum of Harvard University." The Knowlton library is particularly strong in volumes on iris, daylilies, and other horticultural groups.

Improvements have been made in the forestry collection housed in Jamaica Plain. Additional library help has made it possible to complete

Unusual accumulations of snow marked the early months of 1969 when sections of the Arboretum could not be visited on foot.

catalogue changes for the books returned from the Harvard Forest library two years ago. This year the Arboretum accepted the transfer to Jamaica Plain of Widener Library's books on forestry which will be recatalogued later.

A major rearrangement of the periodicals in Jamaica Plain was completed during the winter to provide space for growth. The American periodicals now occupy the main library room, with the British, French, and German language periodicals each in separate alcoves. The reprint files and the collections of nursery catalogues and pamphlets dealing with botanical gardens and arboreta were also reorganized.

Systematic Plant Anatomy:

At the time that the fruit and seed collection was moved to provide additional laboratory space in the Harvard University Herbaria building, the wood collection was consolidated. This procedure offered an opportunity to re-examine the collection of dry and preserved wood specimens and slides and to begin some needed curatorial work. The collection was increased this year by 400 microscope slides of woods of North American trees, prepared in a cooperative program with the North Carolina State University at Raleigh. As usual, specimens of wood samples and slides were sent on loan as requested.

The Arboretum received as a gift the wood collection of the late Ralph F. Perry presented by his family through Mrs. Lyman C. Morrill. This collection of display woods, housed in a special cabinet and maintained in Jamaica Plain, is a valuable teaching aid which includes both polished samples and bark sections

Our collections are being used in several active research programs, including studies of the Ulmaceae by Dr. William Stern and his students at the University of Maryland, who have used wood samples supplemented by material from the living collections. Dr. Bogle is completing his study of the floral morphology and vascular anatomy of the genera of the Hamamelidaceae. With the assistance of Mrs. Roca-Garcia, Dr. Howard has begun an anatomical study of the floral nectaries of the Puerto Rican species of the genus *Marcgravia*. Work on nodal and petiolar anatomy of the families of dicotyledons continues as a major program. Special collections of preserved material from Hong Kong and Macau, supplied by Dr. Hu, have added four families and 40 new genera to the study. A special project was initiated to prepare a key to the plants of Barro Colorado Island based on the structural characteristics of the node and petiole. The material was supplied for this project by Dr. Thomas Croat, in cooperation with the staff of the Missouri Botanical Garden, as part of their study of the *Flora of Panama*.

Education:

Two formal courses in the Department of Biology were offered by members of the Arboretum staff. Dr. Howard taught an advanced one-semester course in plant systematics, Biology 209, "Phylogeny of the Flowering Plants," and Dr. Wood gave Biology 103, "The Taxonomy of Vascular Plants." Dr. Hartley taught the Harvard University Extension Course in general botany throughout the year.

The program of luncheon seminars in systematics held at the Harvard University Herbaria building was conducted by Dr. Wood during the fall semester. Several staff members presented lectures in this series through the year. Drs. Howard, Nevling, and Schubert offered "300" or research courses for graduate students during the year.

At Harvard, as at other universities throughout the world, there was student "unrest" this spring. Several senior staff members, who are members of the Faculty of Arts and Sciences, spent long hours in special meetings of the Faculty and of the Department of Biology during the crisis. They also carried on extended conversations with students as a small contribution toward better communication and improved understanding.

This year Dr. Howard served as one of three teachers in a Tropical Botany Seminar sponsored jointly by the Fairchild Tropical Garden and the University of Miami. The seminar, attended by 12 students from as many colleges, was financed by the National Science Foundation and offered at the Fairchild Tropical Garden. He also took part in symposia in New York, sponsored by the Herb Society of America, and in Geneva,

Switzerland, under the auspices of the Jardin Botanique. He presented lectures on the Baldwin Wallace and Franklin Pierce campuses and was sponsored by the American Institute of Biological Sciences at St. Anselm's College. In addition, he spoke in the series of the Torrey Botanical Club lectures and that of the Worcester Horticultural Society.

Mr. Fordham prepared special lectures and demonstrations for visiting classes from the Universities of Massachusetts, Rhode Island, and Connecticut, and for groups from Tufts, Wheaton, and Pine Manor Junior College. He attended the national convention of the American Rhododendron Society at Pine Mountain, Georgia, where he gave a talk on Rhododendron Propagation. Dr. Sorensen was speaker for a seminar series at the University of New Hampshire. Dr. Nevling gave a seminar on the nature and diversity of climbing plants at the Universidad Nacional Autónoma de México. Mr. Pride talked about the Case Estates and about native plants of New England in a two-day lectures series on Nantucket, in addition to speaking for the Worcester and the Massachusetts Horticultural Societies. Dr. Wood participated in the symposium at the Virginia Polytechnic Institute on the distributional history of the biota of the Southern Appalachians. His lecture was on "Some Floristic Relationships Between the Southern Appalachians and Western North America." In addition, nearly all staff members filled one or more lecture engagements with garden clubs.

Educational displays utilizing materials from the Arboretum collections were prepared by the staff for the Fall Harvest Show of the Massachusetts Horticultural Society and an Iris exhibit for the Worcester County Horticultural Show. Mr. Fordham and Mr. Williams presented lectures in special programs held at the Spring Flower Show of the Massachusetts Horticultural Society.

The Arnold Arboretum Achievement Award for Botanical or Horticultural Excellence was established last year through a special gift for that purpose. The award is made to an outstanding student in one of the high schools in the vicinity of the Arnold Arboretum. This year the award, a choice of books and plant specimens, was made to Mr. Stephen Grace, of Jamaica Plain High School, who plans to continue his education at Salem State College.

Travel and Exploration:

Members of the staff travelled widely during the past year. Dr. Hu returned to Hong Kong where she continued her work towards a revised flora of Hong Kong and the New Territories. She again taught a class at Chung Chi College in exchange for facilities for collecting and drying herbarium specimens. Several new records of plant distribution were obtained for the islands.

Mr. Pride joined a trip to India and Nepal, conducted by Dr. Oleg Polunin, during which he visited montane areas around Darjeeling and Katmandu. On the return trip he visited Wisley; Wageningen, and the

Belmonte Arboretum in Holland; and the Floralie Internationale in Paris. He collected some herbarium specimens and obtained some seeds for trial at the Arnold Arboretum.

Dr. DeWolf, with the support of a grant from the National Science Foundation, made field studies of the species of *Ficus* in Venezuela. He was able to locate and study 97 trees, or populations of 15 taxa, to obtain ecological and morphological data from living plants. Several species which were considered rare or uncommon on the basis of herbarium records proved to be abundant in restricted locations. He was also able to make 38 collections of fig insects for the cooperative study of Mr. J. T. Wiebes, of the Rijksherbarium, Leiden. Herbarium specimens in sets of several duplicates were prepared, dried, and returned with the cooperation of the staff of the Instituto Botánico in Caracas. The aid of many people who assisted Dr. DeWolf is acknowledged with gratitude, among them, Drs. Tobias Lasser and Leandro Aristeguieta, of the Instituto Botánico; Dr. José Rafael García, of the Ministerio de Agricultura; Lic. José de Jesús San José, of the Sociedad Venezolana de Ciencias Naturales; and Dr. Argirmiro Bracemonte, of the Universidad de la Region Centro-Occidental.

Dr. Nevling made a trip to Mexico to continue his collaboration with Dr. Arturo Gómez-Pompa and the staff of the Universidad Nacional Autónoma de México and the Jardín Botánico in their investigations of the flora of the state of Veracruz.

Dr. Howard had completed the biological study of the elfin forest on Pico del Oeste in Puerto Rico as proposed in the original N.S.F. grant, when an unfortunate airplane crash opened a new area of study on a ridge less than a mile from the Pico del Oeste study site, where the elfin forest vegetation was removed for a distance of 300 yards. The exposed site was visited and marked for subsequent studies of regrowth and the development of adventitious shoots, invasion of new species, or the replacement by taxa of the present vegetation, and for erosion under the heavy rainfall conditions of the area.

Members of the staff attended professional meetings in their areas of interest, most of which have been cited in other sections of this report.

Dr. Howard was an invited speaker on the occasion of the 150th anniversary of the founding of the Jardin Botanique in Geneva, Switzerland. A brief vacation following the assembly permitted a visit to the tundra areas of Norway to obtain kodachromes useful in teaching.

Dr. DeWolf, again with the aid of a grant from the National Science Foundation, was able to visit and study at herbaria in England, Germany, and the Netherlands in connection with his research on the species of *Ficus* in Africa and *Dorstenia* in the New World.

Gifts and Grants:

By permission of the President and Fellows of Harvard University and with the aid of members of the Committee to Visit the Arnold Arboretum, invitations were sent this year to solicit membership as Friends of the

An example of snow damage to a hemlock tree. Many of the conifers lost their tops while others were stripped of lower branches.

Arnold Arboretum. The Friends are an informal group of contributors, some of whom have been supporting the general work or special collections for over twenty years. Its members have participated in the open houses and the popular classes in horticulture and botany offered by the staff and have shared in a program of plant distribution and hardiness testing. The Friends supplied active political support in opposition to a bill filed in the Massachusetts legislature to build a ski tow in the Arnold Arboretum, and again this year in opposing a swimming pool and recreational area on the grounds. Over 300 new Friends have joined to help support the Arboretum during the past year, and it is our hope that many more will participate as the Arboretum approaches its Centennial Year.

A Centennial Fund has been established by the Treasurer of the University for gifts to be used during 1972 or in anticipation of it. Part of the development of the Weld-Walter tract has been made possible by this extra financial aid. We are particularly grateful for the generous but currently anonymous gifts to be capitalized until 1972 which are to support field work, plant introduction, and work in special areas of horticulture.

Work on the Generic Flora continued with support from a grant by the National Science Foundation, as has Dr. DeWolf's work on *Ficus*.

Throughout the year the Arnold Arboretum receives many gifts of living plants, books, herbarium specimens, and articles of scientific or historical value which are acknowledged individually by the staff and by the University.

Publications:

The Arnold Arboretum publishes regularly a scientific quarterly, the *Journal of the Arnold Arboretum*, and a popular bulletin, *Arnoldia*, issued in twelve single or combined numbers. The *Journal* gives priority to technical papers by members of the staff but accepts papers from other authors when the subject matter concerns our collections or involves topics of particular relevance to the work of the Arboretum. Under the editorial direction of Dr. Bernice Schubert, 29 articles by 40 authors were published during the past fiscal year for a total of 582 pages. Subscriptions have increased substantially in the last two years, particularly since the first forty-five volumes have become available in a reprint edition. Circulation is the responsibility of Miss Dulcie Powell, who has recently completed a reorganization of the files and records.

Arnoldia was edited, and largely prepared, this year by Dr. Wyman. A total of ten numbers containing 119 pages was published. The largest single issue was an article by Dr. DeWolf entitled "Notes on making an herbarium." This is a modern presentation of the techniques of preparing specimens and contains an excellent bibliography of special articles on the subject. It will replace an article by the late Ivan M. Johnston which is long out of print. Up to now this special number has been requested by twenty-two colleges.

Two special publications were issued during the year. The booklet "Through the Arnold Arboretum," with photographs by Mary Rosenfeld, text by Stephanne Sutton, and art work by Pamela Bruns, is a popular guide to the living collections of the Arboretum. Some of Mrs. Rosenfeld's fine photographs were reproduced in the *Harvard Alumni Bulletin* of March 17, 1969, an issue devoted to Harvard's botanical collections. The Arboretum story, entitled "Harvard is Green," is available for distribution as reprints.

The second special publication, *Flowers of Star Island*, is a study of the vegetation on the Isles of Shoals, a conference center located off the coast of Portsmouth, New Hampshire. Dr. Howard prepared the text and Helen Roca-Garcia the line drawings and silhouettes.

Mercer Fellows:

A portion of the income from the bequest of Mrs. Martha Dana Mercer is used annually as "Mercer Research Fellowships." In most cases the fellowships permit the holder to live in Cambridge or Jamaica Plain while using the collections of the Arnold Arboretum for his special research studies. A few fellowships have been awarded to individuals who wished to work with members of the Arboretum staff in order to learn a particular technique or to become experienced in the operation of various units within the Arboretum. This year for the first time a fellowship was awarded to a graduate student to pursue an academic program leading to a degree, under the direction of a member of the staff. Mr. Mario Sousa-Sanchez from Mexico, who was admitted to the Graduate School of Arts and Sciences, will be engaged in studies toward a Ph.D. degree. His research interest and thesis project concern the genus *Lonchocarpus*, an arborescent member of the Leguminosae, as it occurs in tropical America.

Four scholars were appointed Mercer Research Fellows for all or part of the year. Arthur Charles Gibson, of Miami University, for work with the cultivated plants of New England; Sister Mary Victoria Hayden, of Catherine Spalding College, for work on the family Rubiaceae; Syed Mohammed Anward Kazmi, of Peshawar University, Pakistan, for work on the Boraginaceae of West Pakistan and Kashmir; and Robert William Long, University of South Florida, for work on the family Acanthaceae.

Bibliography of the Published Writings of the Staff

July 1, 1968 — June 30, 1969

BARANOV, A. I. Fruits of *Canarium album* (Lour.) Raeusch — Source of little known foods and medicines of the Chinese. Quart. Jour. Taiwan Mus. **20:** 367–374. 1967.

BOGLE, A. L. Evidence for the hybrid origin of *Petasites warrenii* and *P. vitifolius*. Rhodora **70:** 533–551. 1968.

†BRIZICKY, G. K. A proposal for conservation of the generic name 5015. *Kosteletzkya* Presl, 1835, against *Thorntonia* Reichenbach, 1828. Taxon **17:** 331, 332. 1968.

———. *Sorbus* and the problem of generic typification. Jour. Arnold Arb. **49:** 502–508. 1968.

———. 1805, a proposed starting point for the nomenclature of subgeneric taxa of vascular plants. Taxon **17:** 659, 660. 1968.

——— & W. L. STERN. Notes on the distribution and habitat of *Columellia*. Jour. Arnold Arb. **50:** 76–79. 1969.

———, W. L. STERN, & R. H. EYDE. Comparative anatomy and relationships of Columelliaceae. *Ibid.* **50:** 36–75. 1969.

DEWOLF, GORDON, P., JR. Notes on making an herbarium. Arnoldia **28:** 69–111. 1968.

———. Dr. Donald Wyman. *Ibid.* **29:** (Suppl.) 3 pp. March 7, 1969.

———. The introduction of our hardy Stewartias. *Ibid.* **29:** 41–48. 1969.

FORDHAM, A. J. Hastening germination of some woody plant seeds with impermeable seed coats. Internat. Pl. Prop. Soc. Comb. Proc. **17**: 223–227. 1967.

———. Germination of woody legume seeds with impermeable seed coats. The British Association of Seed Analysts — Bulletin **8**: 10–16. 1968.

———. Vegetative propagation of *Albizia*. Am. Nurseryman **128**: 7, 63. 1968.

———. Dwarf conifers from witches'-brooms, I. Bonsai Bull. **6**: 6–11. Fall 1968.

———. Dwarf conifers from witches'-brooms, II. *Ibid*. **6**: 9–14. Winter 1968–69.

———. *Elliottia racemosa* and its propagation. Arnoldia **29**: 17–20. 1969.

HOWARD, R. A. Polygonaceae. In: Flora of the Netherlands Antilles, *ed*. A. L. STOFFERS. **2**: 88–96. 1966.

———. The Director's Report. The Arnold Arboretum during the fiscal year ended June 30, 1968. Jour. Arnold Arb. **49**: 525–544. 1968.

———. A freeze-dry technique for the plant collector. Rhodora **70**: 410–419. 1968.

———. Flowers of Star Island, The Isles of Shoals. 106 pp. Arnold Arb. Spec. Publ. 1968.

———. The botanical garden — an unexploited source of information. Boissiera **14**: 109–117. 1969.

———. The ecology of an elfin forest in Puerto Rico, 1. Introduction and composition studies. Jour. Arnold Arb. **49**: 381–418. 1968.

———. The ecology of an elfin forest in Puerto Rico, 8. Studies in stem growth and form and of leaf structure. *Ibid*. **50**: 225–262. 1969.

HU, S.-Y. The Compositae of China VI. Quart. Jour. Taiwan Mus. **20**: 283–339. 1967.

———. The Compositae of China VII. *Ibid*. **21**: 1–52. 1968.

———. Some interesting and useful plants of Hong Kong. Chung Chi Bull. **44**: 10–20. 1968. Illustrated.

NEVLING, L. I., JR. Some ways plants climb. Arnoldia **28**: 53–67. 1968.

———. The ecology of an elfin forest in Puerto Rico, 5. Chromosome numbers of some flowering plants. Jour. Arnold Arb. **50**: 99–103. 1969.

——— & P. R. REITZ. Timeleáceas. Flora Illustrada Catarinense. 1–21. 1968.

O'CONNOR, J. Arnold Arboretum — a 'tree trial' garden. Gard. Chron. **164**: 18–20. 1968.

———. The Arnold Arboretum. Quart. Jour. Forestry **62**: 71–73. 1968.

———. The Arnold Arboretum. Nurseryman and Garden Centre **146**: 438, 439. 1968.

———. The Hunnewell Arboretum. Park Administration **1968**: 30, 37. 1968.

PRIDE, G. H. Tupper Hill. Mass. Audubon Mag. **53**: 14–17. 1969.

SAX, K. Possible mutagenic hazards of some food additives, beverages, and insecticides. Jap. Jour. Genetics **43**: 89–94. 1968.

SCHUBERT, B. G. Begonias for the herbarium. Begonian **36**: 107–111. 1969.

———. Report of the Standing Committee on Stabilization: report no. 1. Regnum Vegetabile **60**: 108–114. 1969. (Appendix E, Synopsis of proposals on botanical nomenclature, Seattle 1969.)

SORENSEN, P. D. Discovery of a factor for reproductive self-compatibility in *Dahlia scapigera*. Am. Dahlia Bull. **42**(*2*): 10–14. 1969.

———. Revision of the genus *Dahlia*. Rhodora **71**: 309–365. 1969.

SUTTON, S. B. Through the Arnold Arboretum, text. n.p. Arnold Arb. publ. 1968.

———. National Historic Landmark: Harvard's Arnold Arboretum. Arb. Bot. Gard. Bull. **3**: 42–44. 1969.
———. The Arnold Arboretum. Horticulture **47**: 20, 21, 40, 41, 50. 1969.
VUILLEUMIER, B. S. The genera of Senecioneae in the southeastern United States. Jour. Arnold Arb. **50**: 104–123. 1969.
——— & C. E. WOOD, JR. The typification of *Cacalia* (Compositae-Senecioneae). *Ibid.* **50**: 268–273. 1969.
WOOD, C. E., JR., & G. L. WEBSTER. Tautonyms and confusion in the International Code. Taxon **17**: 645–651. 1968.
WYMAN, D. Metasequoia after twenty years in cultivation. Arnoldia **28**: 113–122. 1968.
———. *Potentilla fruticosa* varieties in the Arnold Arboretum. *Ibid.* 125–131. 1968.
———. Plant registrations. *Ibid.* **29**: 1–8. 1969.
———. Some comparatively new plants worthy of trial. *Ibid.* 9–16. 1969.
———. Casoron — a new weed killer to protect woody plants. *Ibid.* 21–23. 1969.
———. Tree Peonies. *Ibid.* 25–32. 1969.
———. Seventy-five years of growing Rhododendrons in the Arnold Arboretum. *Ibid.* 33–40. 1969.
———. The best of vines. Am. Nurseryman **128**(7): 7–9, 70–74. 1968.
———. The best plants for espaliers. *Ibid.* **128**(9): 10, 11, 88–94. 1968.
———. The best fastigiate trees. *Ibid.* **128**(11): 10, 11, 90. 1968.
———. The best plants for hedges. *Ibid.* **129**(1): 9, 107–114. 1969.
———. The best of the ground covers. *Ibid.* **129**(8): 12, 13, 92–104. 1969.
———. The best plants for screening. *Ibid.* **129**(10): 11, 72–78. 1969.
———. Botanic gardens and arboreta in North America. In: *Supplement to the Dictionary of Gardening*, ed. 2. 201–204. 1969. Clarendon Press, Oxford.

RICHARD A. HOWARD, *Director*

The Board of Overseers of Harvard College
Committee to Visit the Arnold Arboretum

GEORGE PUTNAM, *Chairman*, Boston, Massachusetts.

GEORGE R. CLARK, *Vice-Chairman*, Philadelphia, Pennsylvania.

MRS. GEORGE L. BATCHELDER, JR., Beverly, Massachusetts.

MRS. RALPH BRADLEY, Canton, Massachusetts.

FREDERICK D. BROWN, Webster, Massachusetts.

MRS. PAUL C. CABOT, Needham, Massachusetts.

WILLIAM FLEMER, III, Princeton, New Jersey.

MRS. JULIAN W. HILL, Wilmington, Delaware.

HENRY B. HOSMER, Boston, Massachusetts.

RUSSELL E. LARSON, University Park, Pennsylvania.

MILFORD R. LAWRENCE, Falmouth, Massachusetts.

MRS. JOHN E. LOCKWOOD, Bedford, New York.

HAROLD E. MOORE, JR., Ithaca, New York.

R. HENRY NORWEB, JR., Mentor, Ohio.

AUGUSTIN H. PARKER, Dover, Massachusetts.

MRS. RICHARD W. PRATT, Chestnut Hill, Massachusetts.

FRANCIS W. SARGENT, Boston, Massachusetts.

MRS. HOMER N. SWEET, Boston, Massachusetts.

GEORGE TAYLOR, Kew, England.

JOHN D. WARNER, Commissioner, City of Boston, Department of Parks and Recreation.

MRS. CHARLES D. WEBSTER, Islip, New York.

RICHARD P. WHITE, Washington, D.C.

NATHANIEL WHITTIER, Medfield, Massachusetts.

MRS. JOHN G. WILLIAMS, Gladwyne, Pennsylvania.

Staff of the Arnold Arboretum

1968–1969

RICHARD ALDEN HOWARD, Ph.D., Arnold Professor of Botany, Professor of Dendrology, and Director.

KARL SAX, S.D., Professor of Botany, *Emeritus*.

ALFRED LINN BOGLE, Ph.D., Assistant Curator.

PAMELA ANNE BRUNS, B.A., Artist.

MICHAEL ANTHONY CANOSO, M.S., Senior Curatorial Assistant.*

CONSTANCE ELIZABETH DERDERIAN, Honorary Curator of the Bonsai Collection.

GORDON PARKER DEWOLF, JR., Ph.D., Horticultural Taxonomist.

ALFRED JAMES FORDHAM, Propagator.

WILLIAM ED GRIME, B.A., Curatorial Assistant.*

THOMAS GORDON HARTLEY, Ph.D., Associate Curator of Pacific Botany.

ROBERT STEPHEN HEBB, S.B., Assistant Horticulturist.

WINIFRED PARKER HEBB, S.B., Herbarium Assistant.

HEMAN ARTHUR HOWARD, Assistant Horticulturist.

SHIU-YING HU, Ph.D., Botanist.

THOMAS MATTHEW KINAHAN, Superintendent, Case Estates.

VICTOR FERENC MARX, M.Libr., Librarian.*

LORIN IVES NEVLING, JR., Ph.D., Associate Curator and Supervisor of the Herbaria.*

DULCIE ALICIA POWELL, M.A., Botanist.

GEORGE HOWARD PRIDE, M.A., Associate Horticulturist.

HELEN ROCA-GARCIA, A.M., Research Assistant.

BERNICE GIDUZ SCHUBERT, Ph.D., Associate Curator and Editor.

PAUL DAVIDSEN SORENSEN, Ph.D., Assistant Horticultural Taxonomist.

STEPHANNE BARRY SUTTON, A.B., Archivist.

ROBERT GEROW WILLIAMS, B.S., Superintendent.

CARROLL EMORY WOOD, JR., Ph.D., Associate Curator

DONALD WYMAN, Ph.D., Horticulturist.

* Appointed jointly with the Gray Herbarium.

INDEX